

SPECIAL SPECIFICATION

SECTION 16425S

SWITCHBOARDS

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SPECIAL SPECIFICATION

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SWITCHBOARDS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Main and distribution switchboards. Utilize switchboard construction for boards greater than 1,200 amperes.

1.02 REFERENCES

- A. NEMA PB 2 - Dead Front Distribution Switchboards.
- B. NEMA PB 2.1 - General Instruction for Proper Handling, Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less.
- C. UL 891 - Dead-Front Switchboards.

1.03 SUBMITTALS

- A. Indicate detailed dimensions for the front and side views.
- B. Indicate conduit entrance locations and requirements.
- C. Indicate enclosure material finish and NEMA classification type.
- D. Indicate nameplate legends.
- E. Indicate size and number of bus bars and ground; switchboard instrument details.
- F. Furnish instructions for handling and installation of switchboard.
- G. Include electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.
- H. Provide operation and maintenance manual.
- I. Provide one-line diagram.

- J. Indicate cable terminal sizes.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the site with shipping splits and subassemblies sized for passing through openings.
- B. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.05 SPARE PARTS

- A. Keys: Furnish two each to the Owner for each lock.

1.06 WARRANTY

- A. Warranty design, material and workmanship for not less than 12 months from acceptance by Owner from Contractor.

1.07 SERVICE CONDITIONS

- A. Design For Indoor Use
- B. Seismic Design per IBC 2000: Seismic Design Category D; Use Group 3; Site Class D.
- C. Altitude: 6000 feet above sea level.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Cutler-Hammer.
- B. General Electric.
- C. Siemens.
- D. Square D.

2.02 SWITCHBOARD CONSTRUCTION AND RATINGS

- A. Factory-assembled, dead front, metal-enclosed, and self-supporting switchboard assembly conforming to NEMA PB 2, and UL 891, and complete from incoming line terminals to load-side terminations.
- B. Switchboard electrical ratings and configurations as shown on Drawings. Integrated equipment rating as shown, but not less than 50,000 amperes RMS (sym).
- C. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and number of conductors used.
- D. Main Section Devices: Individually mounted.
- E. Distribution Section Devices: Panel mounted.
- F. Bus Material: Copper with tin plating, sized in accordance with NEMA PB 2.
- G. Bus Connections: Bolted, accessible from front for maintenance. Provide Belleville washers for and properly torque all connections.
- H. Provide fully rated copper neutral bus.
- I. Provide properly sized copper ground bus through the length of the switchboard.
- J. Enclosure: NEMA PB 2 Type 1 - General Purpose. Align sections at front and rear.
- K. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.
- L. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Continuous current rating as indicated on Drawings. Extend and drill main bus for future addition by means of splice plate.

2.03 SWITCHING AND OVERCURRENT PROTECTIVE DEVICES

- A. Solid-state Molded Case Circuit Breakers:

1. Provide with electronic sensing, timing and tripping circuits for adjustable current settings; ground fault trip; instantaneous trip; and adjustable short time trip.
 2. Provide stationary mounting.
 3. Provide ground fault sensing integral with circuit breaker.
 4. Provide solid-state trip on breakers 400 amperes and greater.
- B. Molded Case Circuit Breakers (1,200 amps or smaller):
1. Provide bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles.
 2. Provide circuit breakers UL listed as Type SWD for lighting circuits.
 3. Provide UL Class A ground fault interrupter circuit breakers where scheduled.
- C. Provide ground fault protection on each main device, rated 277/480 volts, 1,000 amps or larger, as follows:
1. UL listed ground sensor relay system, General Electric GSR, with ground break components for each system with coordinated ground sensor (CR) with integral test winding, solid state relay to operate with shunt trip circuit on the switch and monitor panel.
 2. Use time delay type relay with the following features:
 - a. Continuously adjustable current pick-up settings of 100 to 1,200 amperes.
 - b. Continuously adjustable time delay setting from instantaneous (0.03 second) to one second.
 - c. Memory function to recognize and initiate tripping on intermittent ground faults.
 3. Install panel which indicates relay operation and provides means for testing the system with or without interruption of electrical service and does not permit the ground fault system to be inadvertently left in an inactive or 'off' state.
 4. Use ground sensor for zero sequence arrangement on the main service entrance devices.
- D. Where ground fault protection is provided on main breaker, provide ground fault protection on feeder breakers which is capable of being coordinated with main breaker.

- E. On all service entrance switchboards, provide all breakers with Square D powerlogic capable communication and instrumentation capability.

2.04 INSTRUMENTATION

- A. Provide solid state circuit monitor with digital output display rated for **480** volts, 60 hertz and waveform capture feature, Square D Class **3020, Model CM 3250** PowerLogic. Provide UL 508 listing.
- B. Provide six-digit LED readout which will allow local display of the following electrical parameters:
 - 1. Voltmeter, phase to phase and phase to neutral.
 - 2. Current, per phase RMS and 3 phase average.
 - 3. Demand current, per phase.
 - 4. Power factor, per phase and 3 phase total.
 - 5. Real power, 3 phase total.
 - 6. Reactive power, 3 phase total.
 - 7. Apparent power, 3 phase total.
 - 8. Energy (MWH).
 - 9. Reactive energy (MVARH).
 - 10. Frequency.
 - 11. Average demand real power.
- C. Provide the circuit monitor with the following characteristics:
 - 1. Built-in communications capability which will allow multipoint communication at a 9,600 minimum baud rate to a remote computer workstation, programmable controller or other host device.
 - 2. Adjustable demand interval (5 to 60 minutes).
 - 3. Nonvolatile memory for storing all historical data.
- D. Set-up of the monitor shall be accomplished from the front of the device. It shall not be necessary to open the front of the enclosure to reach rear mounted dip-switches. Include set-up parameters for CT ratio, PT ratio, System type 3 or 4 wire, and demand interval.

Switchboards

- E.** Provide the following monitor accuracy in percent of full scale for:
 - 1. Current Voltage Measurements: Plus or minus 1 percent.
 - 2. Power and Energy: Plus or minus 2 percent.
 - 3. Frequency: Plus or minus 0.5 percent.
 - 4. Power Factor: Plus or minus 4 percent.
 - 5. Data Update Time: 0.817 S (4 wire).
- F.** Provide three potential transformers (PT) rated 480/120 volt with metering class accuracy.

2.05 **TRANSIENT VOLTAGE SURGE SUPPRESSION**

- A.** At main service entrance only, provide transient voltage surge suppressors.
- B.** Devices shall comply with IEEE C62.41 and C62.45, NEMA LS-1, UL 1283 and UL 1449.
- C.** Provide suppressors with the following ratings:
 - 1. Peak single-impulse surge rating: 100 kA per phase.
 - 2. Line-to-neutral clamping voltage: 800V maximum.
 - 3. Line-to-ground clamping voltage: 800V maximum.
 - 4. Neutral-to-ground clamping voltage: 800V maximum.
 - 5. Fuse rating: 200kA interrupting capacity.
- D.** Provide permanently wired system with integral disconnect and fuses, redundant modular suppression circuits, indicator lights for power and protection status, audible alarm and 5A, 250VAC dry alarm contact.

2.06 **ACCESSORIES**

- A.** Provide kirk-key interlocks at service entrance switchboards where shown in the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install switchboard in locations shown on Drawings, in accordance with manufacturer's written instructions and NEMA PB 2.1.
- B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- C. Provide a 4-inch concrete housekeeping pad with anchor bolts. Bolt equipment to pad plumb and square.

3.02 FIELD QUALITY CONTROL

- A. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute each.
- C. Check tightness of accessible bolted bus joints using a calibrated torque wrench in accordance with manufacturer's recommended values.

3.03 ADJUSTING AND CLEANING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Touch-up scratched or marred surfaces to return to "as new" condition.
- C. Adjust trip and time delay settings to values shown on Drawings or as required.

END OF SECTION